

FAQ

Q If RAID 1 is used to mirror data for security purposes, what other types of RAID arrays are there, and what are their advantages and disadvantages?

A There are several different types of RAID array, but some are used only in special situations. The other types of RAID most often used are RAID 0 and RAID 5.

RAID 0 is also known as striping. Data that is written to the array is split evenly across two or more physical hard disks. A RAID 0 array has very fast performance, but if one of the disks fails all the data in the array is lost.

RAID 5 uses three or more disks and is a form of striping, but unlike RAID 0 it stores some duplicate information. Using a system called parity means that if any one of the drives in your array fails, the other drives have enough information to restore the lost data. If more than one drive fails, all your data is lost, so RAID 5 is not as secure as a large mirrored array.

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RAID for backup

If you don't have the time or inclination to make backups, Chris Finnamore explains how RAID caddies can do it for you

Making backups of your data is crucial, but it can be a drag to do it and it's easily forgotten. And you can bet that Murphy's Law will step in and destroy your PC the second you forget to make a backup. Fortunately, it doesn't have to be this way. In this month's *PC Builder* we'll show you how you can use RAID technology to make backups of your data automatically, so you can keep your data safe without having to put any effort into it.

Most new PCs support the redundant array of inexpensive disks (RAID). We'll show you how you can configure RAID 1, also known as mirroring, on your PC with two hard disks. Mirroring writes the same data to both hard disks simultaneously, which means you've got an instantaneous backup of your files. Should one drive fail, the other drive still has all your data.

However, this kind of array only protects against the physical failure of one drive. If both drives fail or your computer is damaged in a fire or stolen, you'll lose everything. As you've got two disks, each with their own copy of your data, you should remove one from your computer and keep it somewhere safe to ensure your data is safe from theft and fire.

If you do this, you'll have a RAID 0 array that's writing data to just one disk. But RAID is clever; introducing a third spare disk to the system rebuilds the array automatically and populates the new disk with all your data, including updated files and anything new. All you have to do is swap two of the three disks at regular intervals to keep your backup up to date.

Of course, if you had to delve around the inside of your PC every time you did this, it wouldn't be very convenient. In this month's *PC Builder*, we'll show you how to build a RAID array using SATA hard disk caddies. Caddies let you remove hard disks easily without having to get inside your PC; you can plug in and remove your backup disk in seconds, making it easy to update your RAID array every couple of days and always have a secure backup of your data.

WHAT YOU NEED

Before you start, you'll need the right components. You need three identical SATA hard disks, three SATA RAID caddies, a motherboard with a SATA RAID controller and a case with two free external 5¼" slots. We used Icy Box's 5¼" caddies, which cost £30 each from www.savastore.com. This article assumes the new RAID array will be just for data storage and that you're booting off your PC's original hard disk.

Our steps use NV RAID, which is part of all nForce 4 motherboards. If you have a different board, the steps will be similar, but check your documentation first. Finally, using this system only gives you a backup of your data the way it is currently. If you need to keep multiple versions of files, you'll still need to use backup software to do so.

GETTING STARTED

1 The Icy Box caddy consists of a 5¼" external chassis and a cage to hold the 3½" drive. The cages are locked in place for security, to stop you removing the drive while it is being accessed. Using the supplied key, unlock the cage, lift the handle to release it and pull it free of the chassis. Turn the screw at the rear of the box clockwise to release the cage's lid and slide it off.

Put the hard disk in the cage with the circuit board facing down and the connectors facing towards the opening of the cage. Turn the cage over, line up the screw holes on the bottom of the hard disk with the cage's holes and secure with the four flat screws provided. Slide the lid back on and turn the screw anti-clockwise to lock the lid in place. Repeat the process for the other two hard disks.

2 Mount two of the chassis in two of your PC's 5¼" slots, as you would a normal 5¼" drive. You don't need the third chassis, so safely store this out of the way.

To make sure your PC's hard disk access LED comes on when any of the drives are accessed, you need to wire a hard disk LED cable between each of the drives and the motherboard. Each caddy comes with a cable that has a female one-pin connector, a female two-pin connector and a male two-pin connector.

Slide the one-pin connectors on the pins on the back of each of the caddies. Now plug the female two-pin connector from the first caddy into the hard disk LED headers on your motherboard. Plug the two-pin female connector from the second caddy into the two-pin male connector from the first caddy. Finally, take the cable you unplugged from the motherboard and connect this to the male two-pin connector on the second caddy. Your PC's hard disk light will now come on when either hard disk is accessed.

Plug a SATA cable into each of the chassis and into two RAID SATA ports on your motherboard; check your motherboard's manual for details. Attach the SATA power connectors.

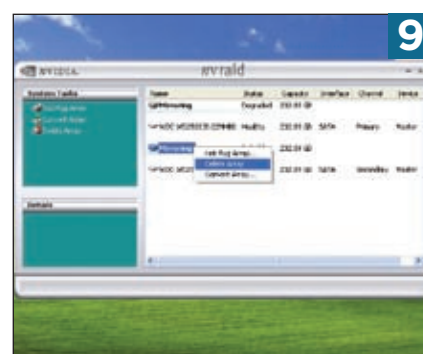
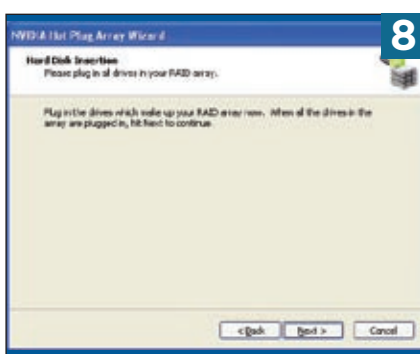
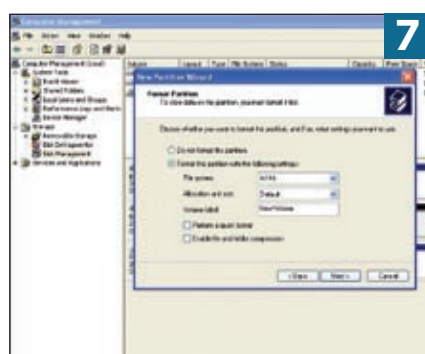
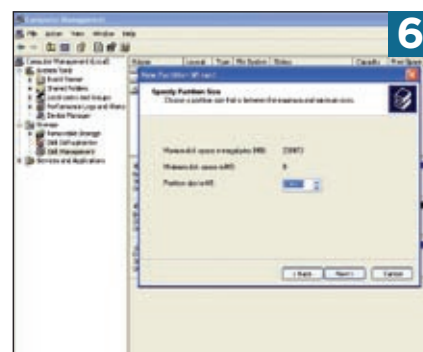
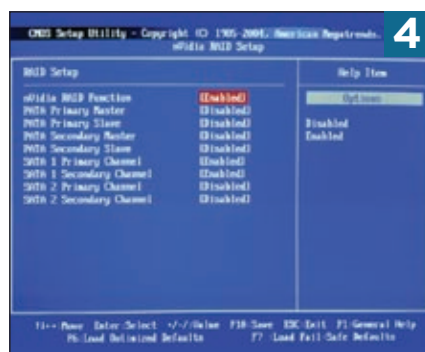
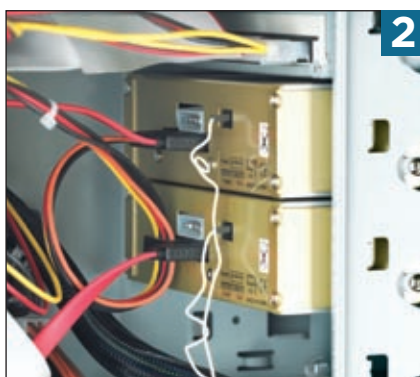
The Icy Box caddy also accepts a four-pin Molex connector and automatically uses whichever type of power plug is connected. Just make sure you don't connect both types of power, as this could damage your hard disk.

3 Install two drive cages into the bare Icy Box chassis. With the handle raised, slide the cage into the drive caddy's chassis. Lower the handle to lock the drive in place. The hard disk's data and power interfaces will connect with the interfaces in the chassis. Lock the drive with the key, or the power to the drive will be shut off. Keep the third hard disk to hand.

Turn on your PC. If the drive caddies are connected correctly, they will glow with a blue light. If they are not glowing, check that the lock on the front of both caddies is in the 'lock' position, and that the SATA interface and power cables are properly connected.

4 If you're not using an nForce 4 motherboard, the exact steps you need to take will differ from ours, although the basic principles remain the same. Go into the BIOS, select Integrated Peripherals and then Raid Config. Enable RAID for the two SATA ports to which your drive caddies are connected. Save your BIOS settings and boot into Windows.

Windows software to manage your RAID array may already be installed, but if it is not you should install it from your motherboard's installation CD or download it from your motherboard manufacturer's website. The basic procedure will be similar, but we have used Nvidia's nVraid as supplied with Nvidia's nForce4 chipsets.



5 Start the RAID software. The right-hand pane will have your two disks listed as separate volumes, with Free Disk above them. In the left-hand pane, click Create Array. The Nvidia Create Array Wizard appears. Click Next.

The next screen lets you select which type of RAID array you want to create. We want to build a mirrored RAID 1 array, so select Mirroring from the drop-down menu. Leave the stripe size at its default setting and click Next again. Select both your disks, and then click Next. The next step gives you the option of selecting a disk that has data you want to keep, but we are adding a new array with blank disks so ignore this step and click Next again. Click Finish.

6 The RAID software's screen now shows your drives as mirrored. The next step is to mount and format your array so Windows will recognise it. Right-click on My Computer and select Manage. In the left-hand tree, select Disk Management. The top portion of the screen shows drives that are currently mounted and the bottom half has information about physical volumes and partitions.

Your new array isn't yet ready, so it won't show up in the top pane. In the bottom pane, it shows up below your system volume and the space is marked as Unallocated. You need to create one or more partitions. Right-click on the unallocated space and select New Partition. In

the New Partition Wizard, click Next, select Primary Partition and click Next. You need to type in the size of the partition. If you intend to have a single partition, just leave the value alone and click Next. Otherwise, enter the size of the partition you want to create.

7 In the next screen, choose the drive letter you want to assign to the array and click Next. You need to format the array. In the next screen, select NTFS, type in the Volume name you want to give your new drive and click Next.

Once the array has finished formatting, it shows up as Healthy in the bottom pane of the disk management screen and appears as a mounted disk in the top pane. It will also be visible in My Computer. You can now use the array as a normal hard disk.

8 Once you've copied your data on to the array, it's time to create your backup. The RAID drives are hot-swappable, so you can swap them around when the PC is still running.

In the nVraid software, click Hot Plug Array and then Next. Insert your key into one of the drive keys, turn it off and remove the hard disk. Take the spare hard disk you put aside earlier and insert it into the blank drive caddy. Lock your drive and wait around 10 seconds for the drive to power up. Click Next and then Finish on the nVraid software.

nVraid will detect that a new volume has been added to the array and start rebuilding it. Keep the disk you removed safe, as it contains an exact copy of all the data in your array.

9 You should update your backup disk at least once a week. The procedure to do this is different from making the first backup, as the RAID software thinks the backup disk is part of a separate array and not a free disk. Follow the instructions in Step 8 to replace one of the drives in the array with the backup disk. The original array appears as Degraded and the new drive appears as a separate degraded array. Right-click on the second drive and select Delete Array, Next and then Finish.

The disk shows up as a Free Disk in nVraid. Right-click on the degraded array and select Rebuild Array. Click Next and select the free disk (there is only one). Click Next and Finish, and the array rebuilds itself. The hard disk you removed is now the new backup drive. You should repeat this process whenever you want to update your backup disk. 

Next Month

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